UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/622,401	08/16/2000	Hans Goran Evald Martin	P/3658-10	3531

2352 7590 08/27/2003

OSTROLENK FABER GERB & SOFFEN
1180 AVENUE OF THE AMERICAS
NEW YORK, NY 100368403

EXAMINER	
LEE, SHUN K	
ART UNIT	**PAPER NUMBER**
2878	

DATE MAILED: 08/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

Office Action Summary	Application No.	Applicant(s)
	09/622,401	MARTIN ET AL.
	Examiner	**Art Unit**
	Shun Lee	2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 June 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *57-62,64,65,67-78,81,82,84-86,88-100 and 102-106* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *57-62,64,65,67-78,81,82,84-86,88-100 and 102-106* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *8/16/00 & 12/31/02* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claims 59, 62, 92, 97, and 104 are objected to because of the following informalities:

(a) in claim 59, “the thermal element” on line 6 should probably be --the thermoelectric sensor element--;

(b) in claim 62, “cavity chamber” on line 4 should probably be --chamber--;

(c) in claim 92, “except the "mth"” on line 5 should probably be --the "mth"-- (see Fig. 11);

(d) in claim 97, “the electromagnetic waves” on lines 2-3 and again on lines 4-5 and “the incident electromagnetic waves” on line 5 and again on lines 7-8 should probably be --said electromagnetic radiation--;

(e) in claim 104, “the thermo-electic sensor element” on lines 17-18 should probably be --thermoelectric sensor element--;

(f) in claim 104, “sensor” on line 19 should probably be --said sensor--; and

(g) in claim 104, “energy” on line 21 should probably be --radiation--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 65 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 65 recites the limitation "the components" in line 4. There is insufficient antecedent basis for this limitation in the claim. Further, claim 65 recites the limitation "before the detector" in line 4 which is vague and indefinite since it is unclear whether "gas detector" or "electromagnetic radiation detector" is the antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 57-61, 65, 67, 69-73, 77, 81, 82, 84, 86, 88, 90-94, 98, 100, and 102-106 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peters *et al.* (US 5,550,375) in view of Chen ("Combustible gas sensor fabricated with 3D-microtechnology", pg. 362-365) and Dschen (DE 41 10 653 A1).

In regard to claims **102**, **81**, **82**, **84**, **98**, and **105**, Peters *et al.* disclose (Figs. 1-3) a gas detector comprising:

(a) a flat base plate (12) formed of a plastic material (column 3, lines 59-67);

(b) a gas cell (*i.e.*, free space or cuvette compartment; column 2, lines 26-30) formed by the flat base plate (12) and a hollow chamber of plastic material (column 2, lines 47-49) extending from a surface of the flat base plate (12), the chamber being operative to enclose a volume of gas to be evaluated (it should be noted that in at least one disclosed embodiment, the chamber comprises the cavities in front of the entrance and exit slits; column 7, lines 1-12);

(c) a source of electromagnetic radiation (*i.e.*, radiation source 7; column 2, lines 36-57) coupled to the gas cell for emission into the chamber;

(d) a coating (column 2, lines 31-35) on an inner surface of the chamber formed of at least one metal layer which forms a highly reflective surface with regard to the electromagnetic radiation;

(e) an electromagnetic radiation detector (*e.g.*, a thermopile 8, 11; column 3, lines 23-27; column 7, lines 1-12) formed integrally with the flat base plate (12) and located within the chamber (again it should be noted that in at least one disclosed

embodiment, the chamber comprises the cavities in front of the entrance and exit slits; column 7, lines 1-12).

The gas detector of Peters *et al.* lacks that the thermopile is mounted on a three-dimensional topographical structure wherein first and second conductive metal layers are located on the topographical structure by application at first and second incidence angles, respectively, wherein the first and second incidence angles are different and other than 90°, so as to form a thermoelectric element (*i.e.*, thermocouple). Thermopiles are well known in the art. For example, Dschen teaches (Figs. 1, 2, 3a-3c) a thermopile on a three-dimensional topographical structure formed by a plurality of thermoelectric junctions (3, 4) on a first plane (5) and a second plane (6) can be formed by the application of two different layers (1, 2) at first and second incidence angles (α_1, α_2). As another example, Chen teaches (column 1, lines 31-60) a thermopile structure with the hot and cold junctions (*i.e.*, thermocouples) on different planes (introduction on pg. 362), in order to obtained an improved sensitivity thermopile (conclusions on pg. 364). Therefore, it would have been obvious to one having ordinary skill to form the thermopile in the gas detector of Peters *et al.* on a three-dimensional topographical structure by application of the first and second conductive metal layers at first and second incidence angles, in order to obtained an improved sensitivity thermopile as taught by Chen (Dschen).

In regard to claims **104**, **57**, **58**, **60**, **61**, **77**, and **106**, Peters *et al.* in view of Chen and Dschen is applied as in claims 102, 81, 82, 84, 98, and 105 above. Peters *et al.*

also disclose (column 2, lines 36-57; column 3, lines 45-58) that shaped parts can be produced by a LIGA process (*i.e.*, lithographic etching, electroplating, and casting).

In regard to claim **59** which is dependent on claim 104, Peters *et al.* also disclose (column 2, lines 53-57) that the method further comprises applying said electromagnetic radiation detector (*i.e.*, IR radiation receiver) on a limited surface portion of the surface of the base plate, and applying required electric conductors or electric circuits (*i.e.*, electronic elements) to the thermal element on the limited surface portion.

In regard to claim **65** (which is dependent on claim 104 in so far as understood) and claim **86** (which is dependent on claim 102), Peters *et al.* also disclose (column 2, lines 50-57) electronic elements for amplifying the detector signals. Inherent in detector signal amplifying electronic elements are detector connection pads in order to provide electric conductive paths for transmitting the detector signals from the metal layers of the thermopile detector to the amplifying electronic elements for amplification.

In regard to claims **67** and **71-73** (which are dependent on claim 57) and claims **88** and **92-94** (which are dependent on claim 81), the method and apparatus of Peters *et al.* lacks a detailed description of the thermopile as an array (*i.e.*, n columns by m ridges) of conductive ridges (having a first thermocouple junction on the ridge upper surface and a second thermocouple junction at an intermediate surface located between mutually adjacent conductive ridges) with each conductive ridge electrically series interconnected. Dschen teaches (abstract; Fig. 1) an array (*i.e.*, n columns by m ridges) of thermocouple junctions (*i.e.*, a thermopile) having a first thermocouple junction on the ridge upper surface and a second thermocouple junction at an

intermediate surface located between mutually adjacent conductive ridges. Therefore, it would have been obvious to one having ordinary skill that the thermopile in the method and apparatus of Peters *et al.* is formed as an array (*i.e.*, n columns by m ridges) of conductive ridges (having a first thermocouple junction on the ridge upper surface and a second thermocouple junction at an intermediate surface located between mutually adjacent conductive ridges) with each conductive ridge electrically series interconnected as is known in the art.

In regard to claims **69** and **70** (which are dependent on claim 67) and claims **90** and **91** (which are dependent on claim 88), it is inherent in the thermopile of Peters *et al.* that electrically insulated surface sections (without both said first and said second metal layers) are formed at said intermediate conductive surfaces located at surface sections surrounding and adjacent to the thermopile of said base structure since it is clear that the thermopile is of a finite extent and located at one region in order to observe one or a few wavelengths (see column 3, lines 28-31).

In regard to claim **100** which is dependent on claim 102, Peters *et al.* also disclose (column 2, lines 53-57; column 3, lines 28-33) rows of radiation receivers.

In regard to claim **103** which is dependent on claim 102, Peters *et al.* also disclose (column 2, lines 36-57) that the circuit arrangements for the conductive metal layers are located outside the chamber.

7. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peters *et al.* (US 5,550,375) in view of Chen ("Combustible gas sensor fabricated with

3D-microtechnology", pg. 362-365) and Dschen (DE 41 10 653 A1) as applied to claim 104 above, and further in view of Larsson (Micro Structure Workshop 1996, pp. 5.1-5.8).

In regard to claim **62** which is dependent on claim 104, the modified method of Peters *et al.* lacks forming the mold for the shaping operation by mechanically working a substrate, wherein the configuration of the substrate is complementary with respect to the topographical structure to be formed. Microreplication techniques are known in the art. For example, Larsson teaches (Fig. 1; sections on Microreplication technology and Micromachining of the master) to choose the type of master fabrication technique (*e.g.*, micromachining instead of LIGA which is expensive) depending on application, costs, development time and needed accuracy. Therefore, it would have been obvious to one having ordinary skill to use micromachining in the modified method of Peters *et al.*, in order to use a less expensive master fabrication technique.

8. Claims 64, 68, 76, 78, 85, 89, 97, and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peters *et al.* (US 5,550,375) in view of Chen ("Combustible gas sensor fabricated with 3D-microtechnology", pg. 362-365) and Dschen (DE 41 10 653 A1) as applied to claims 67, 88, 98, 102, and 104 above, and further in view of Baxter (US 4,111,717).

In regard to claim **64** (which is dependent on claim 104) and claim **85** (which is dependent on claim 102), Peters *et al.* also disclose (column 2, lines 31-35) that the surface of the cavity should be coated with metal layer having good reflectivity in the spectral range used (*i.e.*, IR radiation). The modified method and apparatus of Peters *et al.* lacks that the interior of the cavity is coated with the same metal as the

topographical structure of the detector at the same time. Baxter teaches (column 3, lines 17-31) that a thermopile is coated with a metal that serves the dual purpose of forming a cold thermocouple junction and a heat (*i.e.*, IR radiation) reflector. Therefore, it would have been obvious to one having ordinary skill to coat the cavity surface with the same metal used to form the thermocouple junctions of the thermopile in the modified method and apparatus of Peters *et al.* in order to obtain a cavity surface having good reflectivity in the spectral range used (*i.e.*, IR radiation).

In regard to claim **68** (which is dependent on claim 67) and claim **89** (which is dependent on claim 88), the modified method and apparatus of Peters *et al.* lacks that the topographical structure including the ridges are positioned relative to incident electromagnetic waves so that the waves irradiate the upper surfaces of the ridges but the ridges shadow the intermediate conductive surfaces against incident electromagnetic waves. Baxter teaches (column 3, lines 46-55) to provide a reflective area overlying a portion of the cold junctions in order to reduce the influence of stray radiation on the cold junctions. Therefore, it would have been obvious to one having ordinary skill to provide a reflective area (*e.g.*, hot junctions) overlying a portion of the cold junctions on intermediate conductive surfaces in the modified method and apparatus of Peters *et al.*, in order to reduce the influence of stray radiation on the cold junctions (*i.e.*, the cold junctions will be in the shadow of the hot junctions on conductive ridges).

In regard to claim **76** (which is dependent on claim 68) and claim **97** (which is dependent on claim 89), it is inherent in the modified method and apparatus of

Peters *et al.* that the first metal has a first reflection coefficient with respect to the electromagnetic waves and the second metal has a second reflection coefficient with respect to the electromagnetic waves. The modified method and apparatus of Peters *et al.* lacks that parts of the detector are positioned relative to the incident electromagnetic waves and the metal layers and the conductive ridges are so positioned that the metal having the lowest of the first and second reflection coefficients covers the side surfaces of the ridges that face the incident electromagnetic waves. Baxter teaches (column 3, lines 46-55) to provide a reflective area (*e.g.*, gold) overlying a portion of the cold junctions in order to reduce the influence of stray radiation on the cold junctions. It should be noted that by definition, a material with a low reflection coefficient has less reflected radiation than a material with a higher reflection coefficient. It should also be noted that stray radiation comprises of reflected incident radiation. Therefore, it would have been obvious to one having ordinary skill to position the surface of said detector relative to incident electromagnetic waves in the modified method and apparatus of Peters *et al.* so as to provide a reflective area (*e.g.*, the first metal forming the cold junction with a lower reflection coefficient than the second metal forming the cold junction) overlying a portion of the cold junctions, in order to reduce the influence of stray radiation on the cold junctions.

In regard to claim **78** (which is dependent on claim 76) and claim **99** (which is dependent on claim 98), the modified method and apparatus of Peters *et al.* lacks that the first and second metal layers respectively comprise gold covering chromium. Baxter teaches (column 2, line 65 to column 3, line 40) it is well known in the art that

thermopiles comprise of a plurality of hot and cold thermocouple junctions formed by the joining of two electrical conductors of different composition such as for example chromium alloy or gold. Therefore, it would have been obvious to one having ordinary skill to that the thermopile in the modified method and apparatus of Peters *et al.* comprise of different types of conductors such as gold and chromium.

9. Claims 74, 75, 95, and 96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peters *et al.* (US 5,550,375) in view of Chen ("Combustible gas sensor fabricated with 3D-microtechnology", pg. 362-365) and Dschen (DE 41 10 653 A1) as applied to claims 67 and 88 above, and further in view of Baxter (US 4,111,717) and Grinberg *et al.* (US 4,922,116).

In regard to claims **74** and **75** (which are dependent on claim 67) and claims **95** and **96** (which are dependent on claim 88), the modified method and apparatus of Peters *et al.* lacks a heat absorbent layer (*e.g.*, carbon) covering the upper surface of each of the ridges; and a heat reflecting layer (*e.g.*, a metal) covering the intermediate conductive surfaces between adjacent ridges. Baxter teaches (column 3, lines 46-55) to provide a reflective area (*e.g.*, gold) overlying a portion of the cold junctions in order to reduce the influence of stray radiation on the cold junctions. Grinberg *et al.* teach (column 9, lines 60-64; column 11, lines 35-38) that the upper surface of the bridges is covered with a heat-absorbent layer (*e.g.*, carbon black, metallic gold black, or black paint) in order to increase the temperature variation. Therefore, it would have been obvious to one having ordinary skill to provide a heat-absorbent layer on upper surface of respective conductive ridges and heat-reflecting layer on the cold junctions at

intermediate conductive surfaces in the modified method and apparatus of Peters *et al.*, in order to reduce the influence of stray radiation and increase the temperature variation as taught by Baxter and Grinberg *et al.*

Response to Arguments

10. Applicant's arguments filed 9 June 2003 have been fully considered but they are not persuasive.

Applicant argues (last three paragraphs on pg. 14 of remarks filed 9 June 2003) that Peters *et al.* does not teach or suggest "a source of electromagnetic radiation outside the chamber". Examiner respectfully disagrees. Peters *et al.* state (column 2, lines 50-53) that "The IR radiation source and the IR radiation receiver(s) may, if appropriate, be connected to the shaped part by means of an optical waveguide which guides the IR radiation". Thus it is clear that in at least one disclosed embodiment, IR radiation is coupled by means of an optical waveguide for emission into the chamber of the shaped part.

Applicant also argues (first two paragraphs on pg. 15 of remarks filed 9 June 2003) that Peters *et al.* does not teach or suggest "an electromagnetic radiation detector formed on a three-dimensional topographical structure integral with a plastic base plate and located inside the chamber". First, it should be noted that Peters *et al.* do teach or suggest a radiation detector located inside the chamber. As discussed above, Peters *et al.* disclose (Figs. 1-3) a gas cell (*i.e.*, "The free space is covered by a plate which is joined in a sealing manner to the shaped part. The gas to be tested is introduced into, and discharged from, the space through orifices. The free space serves as a cuvette compartment for the gas to be tested"; column 2, lines 26-30) formed by the flat base plate (12) and a hollow chamber of plastic material (column 2, lines 47-49) extending from a surface of the flat base plate

(12), the chamber being operative to enclose a volume of gas to be evaluated. Peters *et al.* also state (column 6, line 64 to column 7, line 12) that "On the outside of the entrance and exit slits, the shaped part contains a cavity having coated walls for radiation conversion within the wavelength range under consideration. The cover plate (12) for the free space consists of a silicon plate which contains a thin-film resistance heater element for generating the IR radiation, as well as a plurality of thermopiles as radiation receivers. The cover plate (12) further contains a plurality of preamplifiers for amplifying the signals of the radiation receiver and an electronic circuit for analyzing and processing the signals, as well as electronic elements for driving the IR radiation source. Radiation source and radiation receiver are arranged at those points of the cover plate, which, when the plate is placed on the single piece shaped part, are situated above the cavities in front of the entrance and exit slits". Peters *et al.* further state (column 3, lines 23-27) that "Suitable radiation receivers include, e.g., thermopiles, pyroelectric receivers or bolometers, as well as photoconductors and semiconductor receivers made of GaAs, PbS or PbSe. In front of the radiation receiver there may be disposed, if required, an exit slit of suitable width". It is important to recognize that the chamber (formed by the flat base plate 12 joined in a sealing manner to the single piece shaped part) includes cavities (contained in the shaped part) adjacent optional exit slits (4,11) where the radiation detectors (8, 11) are positioned. Thus it is clear that in at least one disclosed embodiment, thermopile radiation detectors (8, 11) are located on the surface of the flat base plate (12) inside the chamber (*i.e.*, at cavities adjacent optional exit slits).

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir.

1986). The thermopile located inside the chamber of Peters *et al.* was not described in great detail. However, thermopiles are well known in the art. For example, Dschen teaches (Figs. 1, 2, 3a-3c) a thermopile on a three-dimensional topographical structure formed by a plurality of thermoelectric junctions (3, 4) on a first plane (5) and a second plane (6) can be formed by the application of two different layers (1, 2) at first and second incidence angles (α_1, α_2). As another example, Chen teaches (column 1, lines 31-60) a thermopile structure with the hot and cold junctions (*i.e.*, thermocouples) on different planes (introduction on pg. 362), in order to obtained an improved sensitivity thermopile (conclusions on pg. 364). Therefore, it would have been obvious to one having ordinary skill to form the thermopile in the gas detector of Peters *et al.* on a three-dimensional topographical structure by application of the first and second conductive metal layers at first and second incidence angles, in order to obtained an improved sensitivity thermopile as taught by Chen (Dschen).

Applicant then argues (third paragraph on pg. 15 of remarks filed 9 June 2003) that the devices of Dschen and Chen are used as catalytic converter sensors in a high temperature environment (*e.g.*, 300°C) and there is no suggestion that such devices would be useful in the invention of Peters *et al.* Examiner respectfully disagrees. Peters *et al.* state (column 4, lines 14-16) that "The sensor operates in the range of normal room temperature; if made of metal, it can also be used at elevated temperature" and (column 4, lines 20-24) that "By means of the sensor the safety of systems in which flammable, toxic or other gases are contained or may occur or may escape from such systems, can be considerably increased in an economic manner". Thus it is clear that in at least one disclosed embodiment, Peters *et al.*

teach or suggest analysing flammable, toxic or other gases at normal room or elevated temperatures. Thus there are suggestions that the devices of Dschen and Chen would be useful in the invention of Peters *et al.* for analysing flammable, toxic or other gases at normal room or elevated temperatures.

Applicant further argues (last paragraph on pg. 15 of remarks filed 9 June 2003) that there is no suggestion that the devices of Dschen and Chen can provide improved sensitivity and cites pg. 362, fifth paragraph of the introduction section as support. Examiner respectfully disagrees. Chen states (pg. 362, fifth paragraph of the introduction section) that "the thermal conductance is still high, thus limiting the sensitivity". Thus it is taught that sensitivity depends on thermal conductance and that a high thermal conductance limits the sensitivity. Further, Chen concludes by stating (pg. 364, third paragraph of the conclusion section) that "Increasing the ratio height of the ripples/width of the space between the ripples improves the sensitivity". Thus Chen discloses an improved sensitivity thermopile with increased ratio height of the ripples/width of the space between the ripples. Therefore, it would have been obvious to one having ordinary skill to form the thermopile in the gas detector of Peters *et al.* on a three-dimensional topographical structure by application of the first and second conductive metal layers at first and second incidence angles, in order to obtained an improved sensitivity thermopile as taught by Chen (Dschen).

In addition, applicant argues (last four paragraphs on pg. 16 of remarks filed 9 June 2003) that the radiation detector of Peters *et al.* is located outside the chamber.

Examiner respectfully disagrees since the radiation detector of Peters *et al.* is located inside the chamber as discussed above.

Applicant than argues (last paragraph on pg. 16 of remarks filed 9 June 2003) that it would not be obvious to form a topographical structure which will be located in side the chamber since the radiation detector of Peters *et al.* not located inside the chamber. Examiner respectfully disagrees. Since the radiation detector of Peters *et al.* is located inside the chamber as discussed above, it would have been obvious to one having ordinary skill to form the thermopile in the gas detector of Peters *et al.* on a three-dimensional topographical structure by application of the first and second conductive metal layers at first and second incidence angles, in order to obtained an improved sensitivity thermopile as taught by Chen (Dschen).

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (703) 308-4860. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (703) 308-4852. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

SL
August 20, 2003

DAVID PORTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800